

The DS1 Mission and the Validation of the SCARLET Advanced Array

On October 24, 1998, the first of the NASA New Millennium Spacecraft, DS1, was successfully launched into Space. The objectives for this spacecraft are to test advanced technologies that can reduce the cost or risk of future missions. One of these technologies is the SCARLET concentrating solar array. Although part of the advanced technology validation study, the array is also the spacecraft's power source. Funded by BMDO, the SCARLET concentrator solar array is the first application of a refractive lens concentrator designed for space applications. As part of the DS1 validation process, the amount of diagnostics data that will be acquired is more extensive than would be the norm for a more conventional solar array. These data include temperature measurements at numerous locations on the 2-wing, 4-panel per wing, solar array. For each panel, one 5-cell module in one of the circuit strings is wired so that a complete I-V curve can be obtained. This data is used to verify sun pointing accuracy and array output performance. In addition, the spacecraft power load can be varied in a number of discrete steps from a small fraction of the array total power capability, up to maximum power. For each of the power loads, array operating voltage can be measured along with the current output from each wing.

Preliminary in-space measurements suggest SCARLET performance is within one (1) percent of predictions made from ground data. This paper will briefly discuss the SCARLET configuration and critical features. Emphasis will be given to the results of the in-space validation, including array performance as a function of changing solar distance and array performance compared to pre-launch predictions.

Topical Area 1.2 , Space Solar Power Systems

*space solar array
photovoltaics
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